



NASA's Contributions to the Gulf of Mexico Alliance

Mark Glorioso

*Gulf of Mexico Program
Management Meeting
July 9, 2008*

Decision Support through Earth Science Results

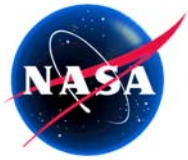


The NASA Vision

To improve life here,
To extend life to there,
To find life beyond.

The NASA Mission

To understand and protect our home planet,
To explore the universe and search for life,
To inspire the next generation of explorers
... as only NASA can.



Topics



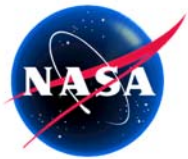
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The 30,000 foot view of NASA

- Earth Science at NASA
- Applied Sciences Program

To the microscopic level

- Coastal Initiative for the Gulf of Mexico
- ROSES Solicitation



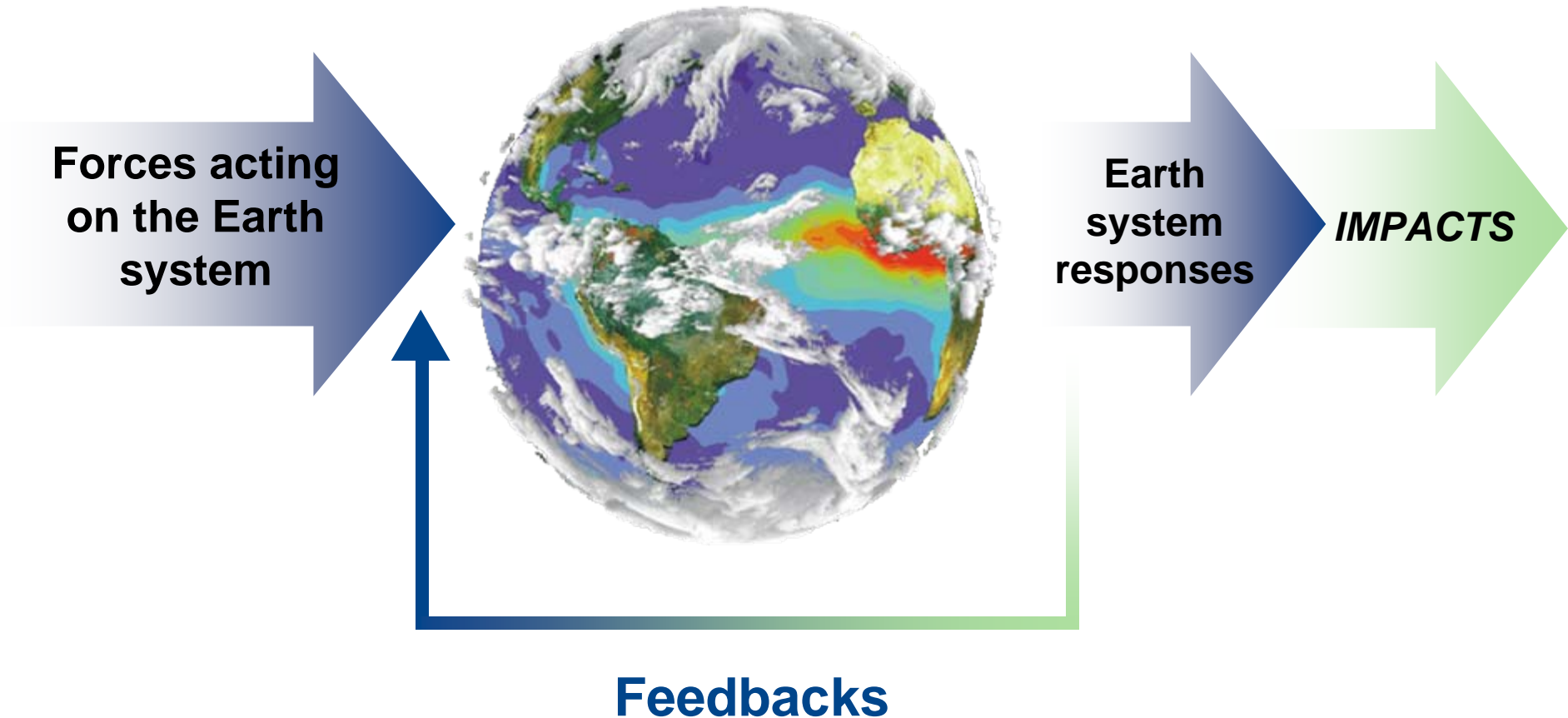
Take Away



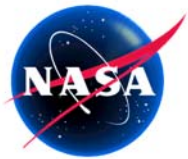
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- NASA's remote sensing and science capability
- NASA SSC is focused on Gulf of Mexico Alliance
- We are looking for a few good Coastal Scientist

Earth Systems Science



Of the total forcing of the climate system, 40% is due to the direct effect of greenhouse gases and aerosols, and 60% is from feedback effects, such as increasing concentrations of water vapor as temperature rises.

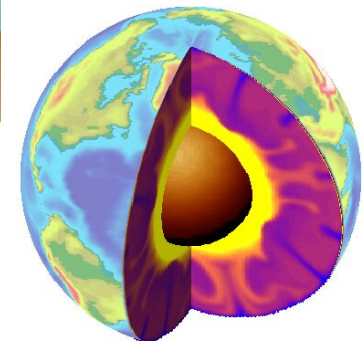
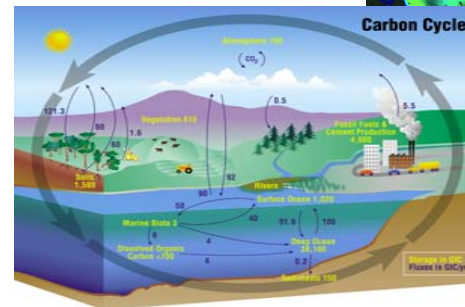
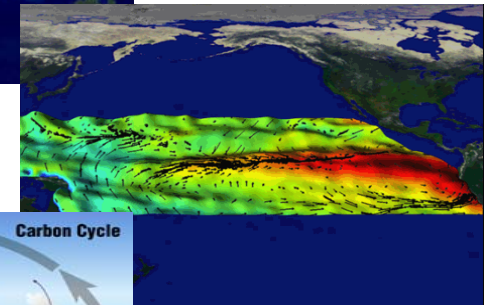
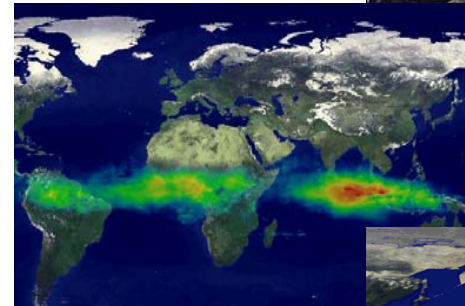
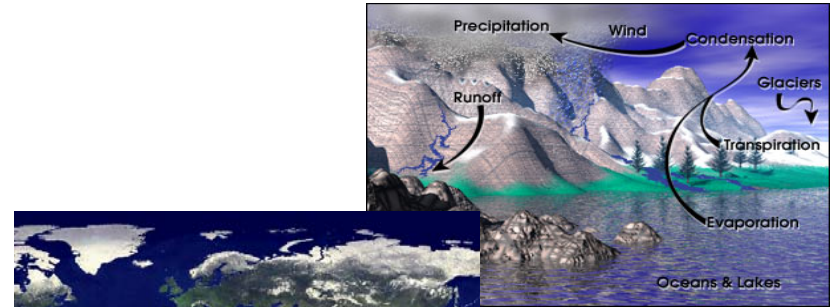


Earth Science Research Areas



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- Climate Variability
- Atmospheric Composition
- Ecosystems & Carbon Cycle
- Water & Energy Cycle
- Weather Research
- Solid Earth Science

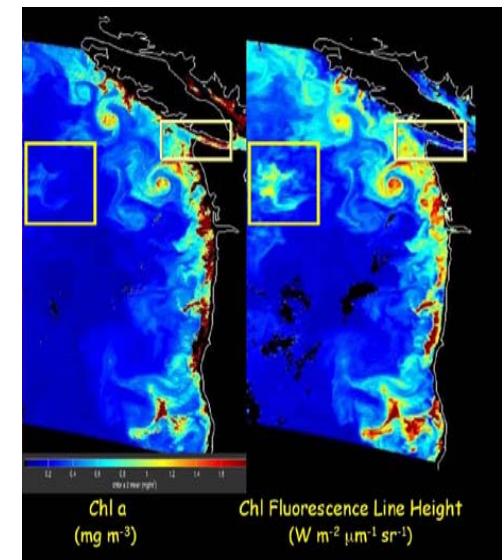
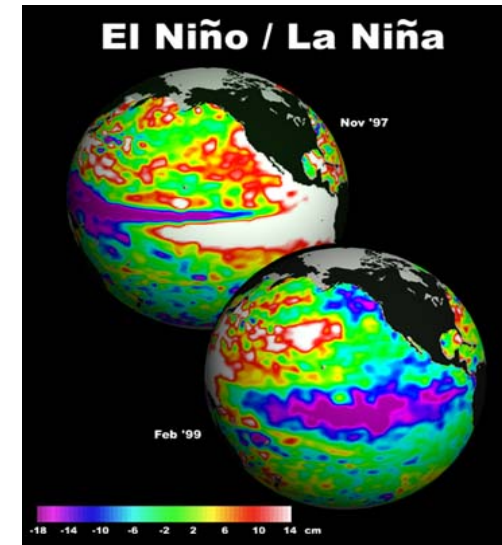


Tools: 14 Major Satellites in Orbit



Current Missions: Direct Coastal Applications

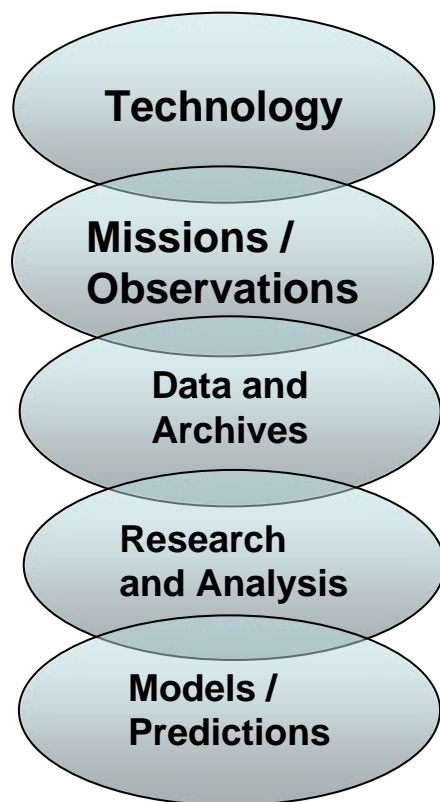
- **Jason-1**
 - Ocean Surface Topography
 - Ocean Circulation
- **GRACE**
 - Ocean Circulation
- **QuikSCAT**
 - Wind speed and direction over the Earth's oceans
- **Terra and Aqua**
 - MODIS (harmful algal blooms, etc.)
- **NPP**
 - VIIRS (harmful algal blooms, etc.)
- **OSTM**
 - Ocean Surface Topography
 - Aquarius
 - Sea surface salinity



NASA Earth Science Applications

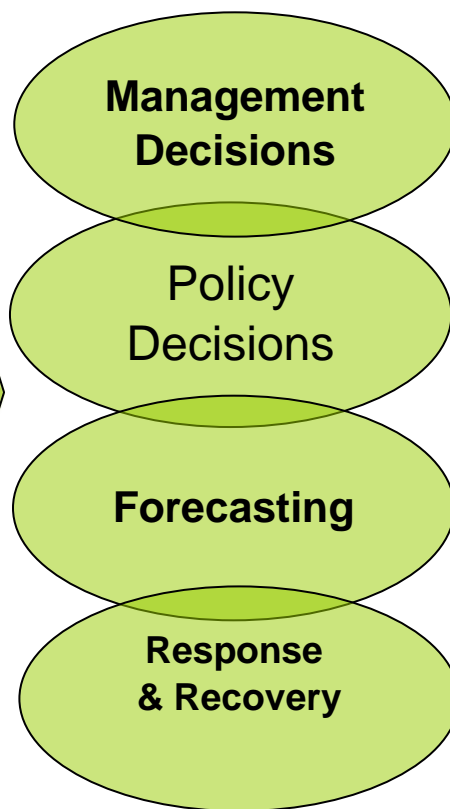
Applied Sciences will work across the “gap” and will utilize all means to utilize Earth Science results, within the limits of NASA’s mission

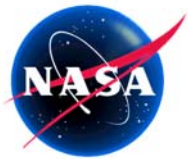
Earth Science Results



Applications

Societal Needs



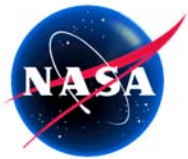


NASA Response to Governor Barbour



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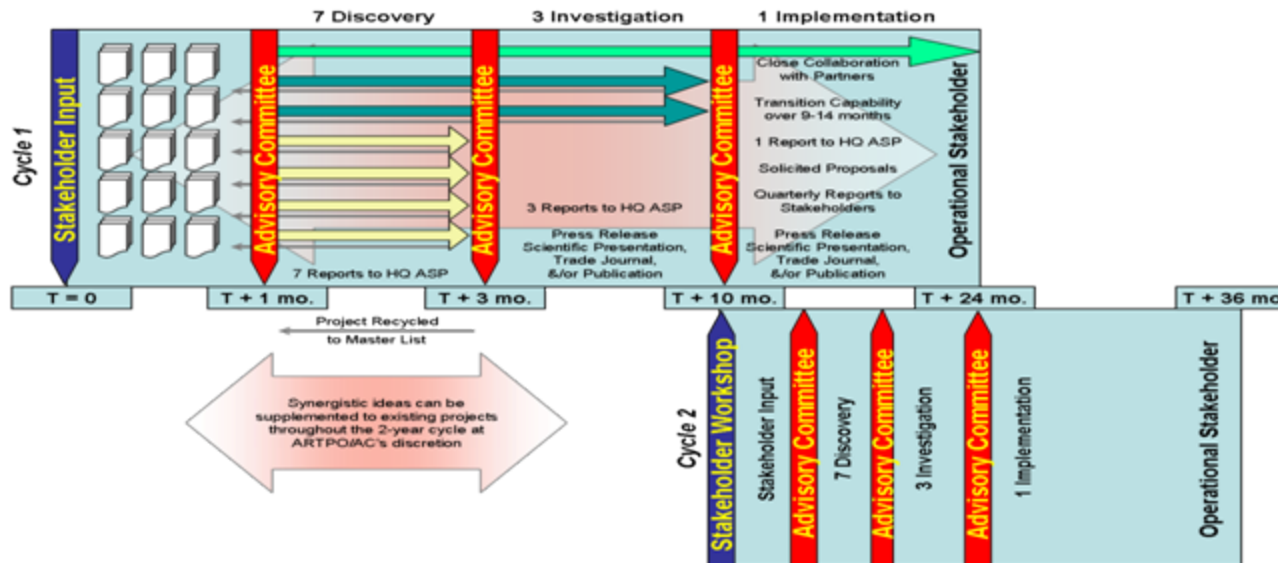
- **Coastal Initiative Focused on Gulf of Mexico**
 - Product-driven approach to Gulf of Mexico issues
 - Emphasis on NASA-SSC collaborations with GOMA Federal, State, and regional partners
- **Goals of NASA Gulf Coast Applications Program at SSC**
 - Focus NASA-SSC expertise, capability on coastal science to support Gulf management issues and NASA Applied Sciences Program strategy
 - Strengthen collaborations and integrate projects with GOMA entities and other regional efforts
 - Evaluate NASA and affiliated data and research results for Gulf of Mexico coastal management suitability
- **Initial Projects**
 - Gulf of Mexico Alliance Applications Pilot: Assessing Land-Use Land-Cover Change in the Mobile Bay Region from 1972-Present
 - Coastal Online Assessment and Synthesis Tool (COAST) data acquisition, display, and visualization in Gulf-wide or estuary format
 - Integrated Approach to Hypoxia Assessment of the Northern Gulf Of Mexico



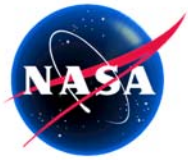
Methodology 7-3-1



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- Independent Steering Committee established (Oct 07)
- 28 one page proposals reviewed (Dec 07)
 - 7 selected for proposal development
- Select 4 for further development (Mar 08)
- Steering committee will meet again to review results of the “4” (Sept 08)



Four Investigation Projects



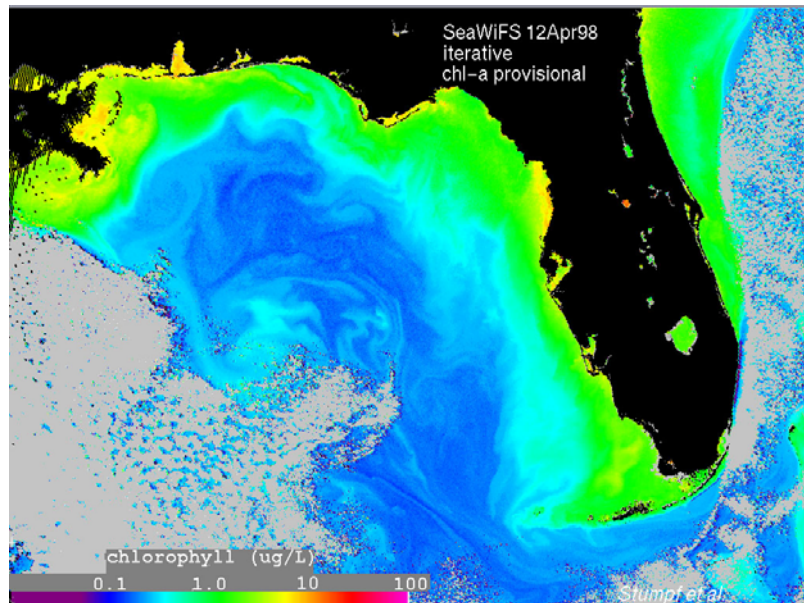
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- Estimating Intra-Annual Nutrient Loading in Streams and Rivers in Northern Gulf Catchments Using Remote Sensing Data Products and Watershed Models
- Use of NASA Satellite Data in Monitoring Gulf Coast Forest Conditions
- Coastal Marsh Monitoring for Persistent Saltwater Intrusion
- Standardized, Satellite-Derived Suspended Particulate Matter Product for Gulf of Mexico Coastal Waters

Coastal Management

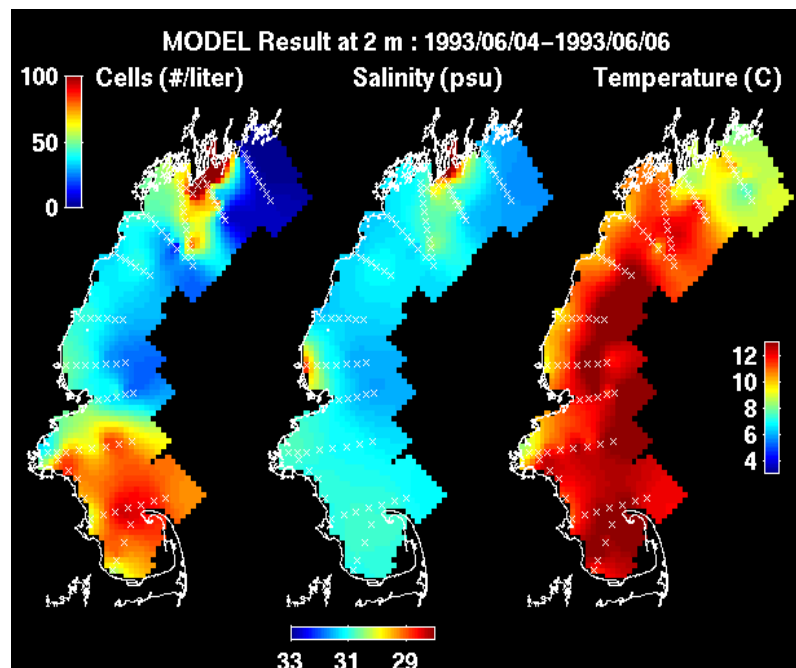


Predicting Algal Blooms



Current Capacity:

Respond to bloom detection with bio-physical models using satellite data and *in situ* sampling to forecast trajectories and impacts



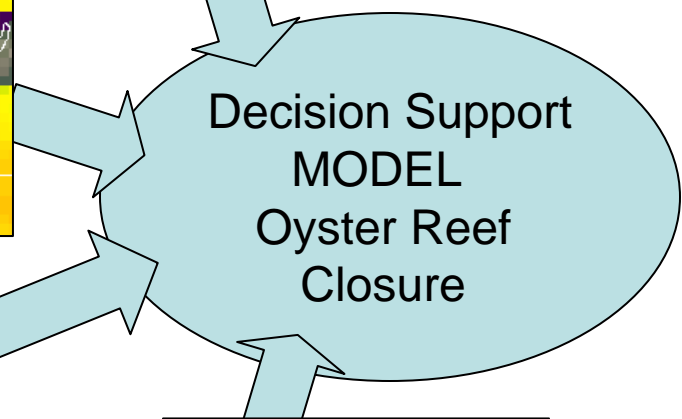
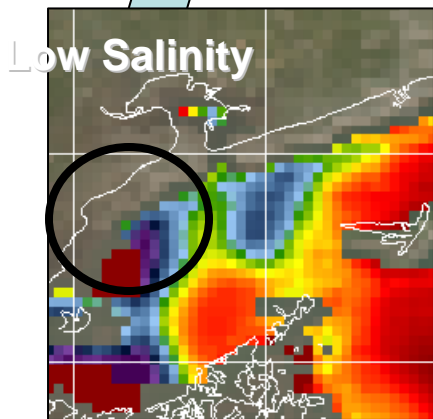
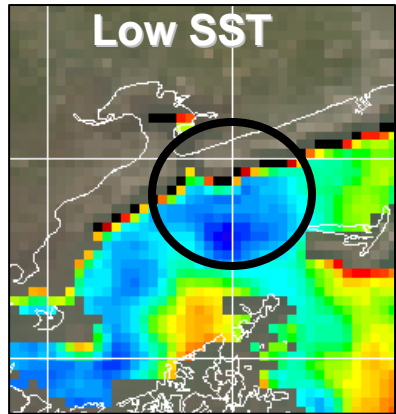
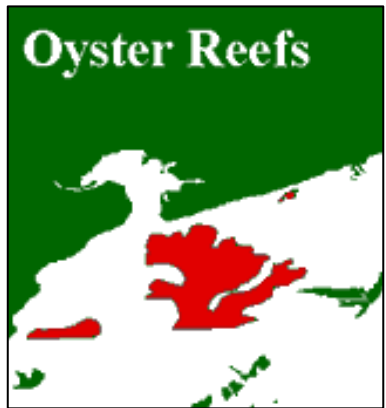
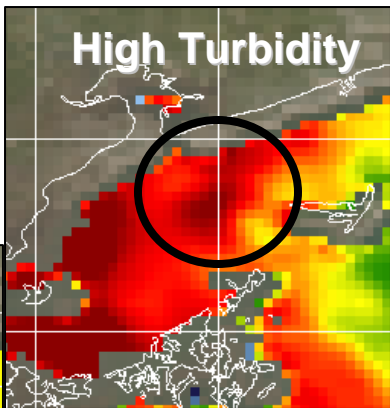
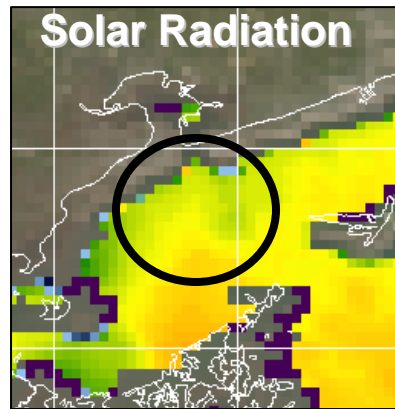
Future Capacity:

Prediction of bloom onset

Oyster Reef Management in the Mississippi Sound



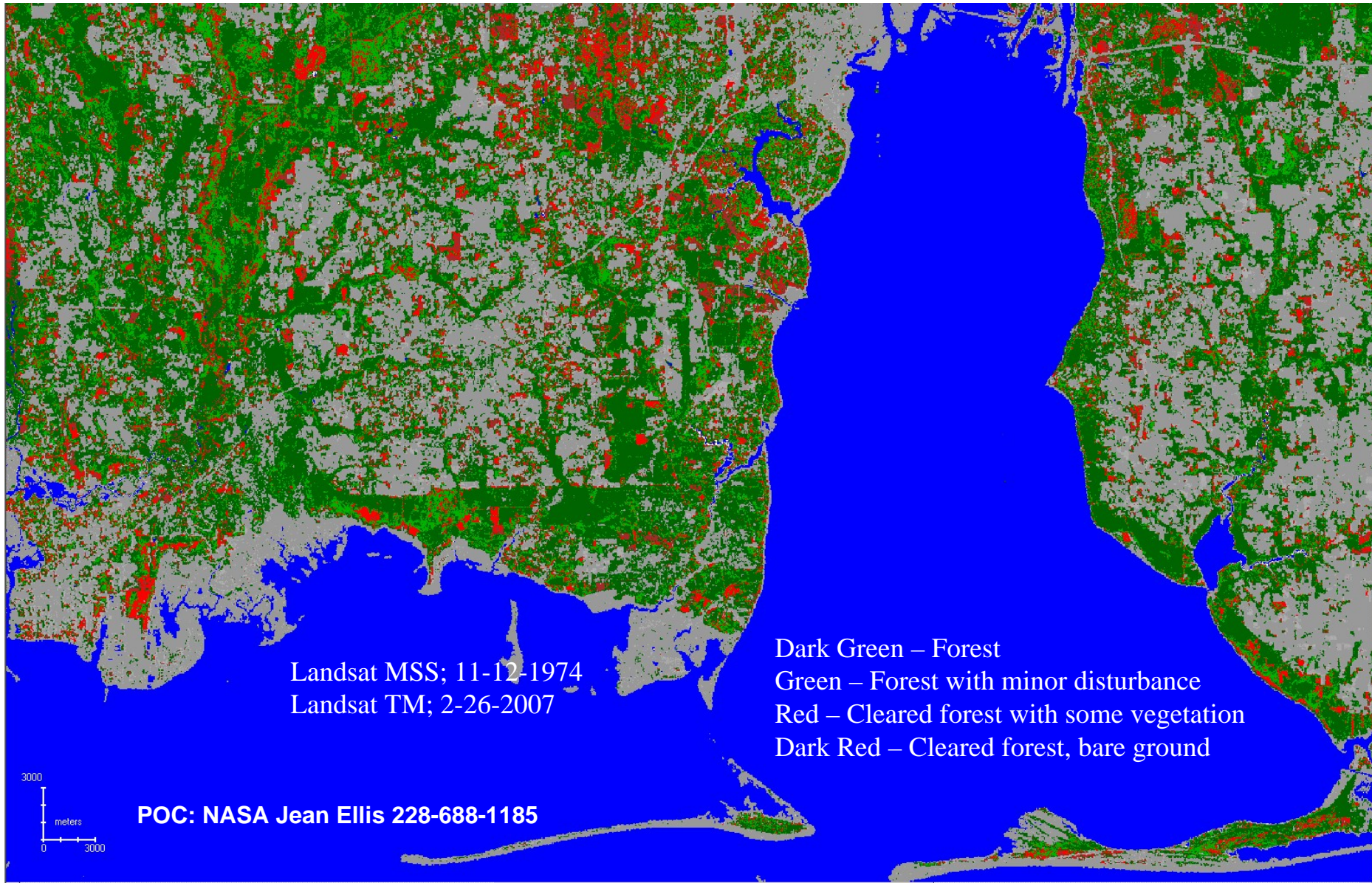
MODIS Products
Used for Managing
Coastal Resources



- DMR officials close oyster reefs at high fecal coliform levels
- Fecal coliform correlated to relative solar radiation, cloud cover, SST, river runoff (turbidity) and salinity
- NRL Stennis provides MODIS-derived solar radiation, SST, turbidity, salinity products to NOAA/NCDDC
- NOAA/NCDDC provides these data to Mississippi DMR for use in their fecal coliform decision tools for oyster reefs

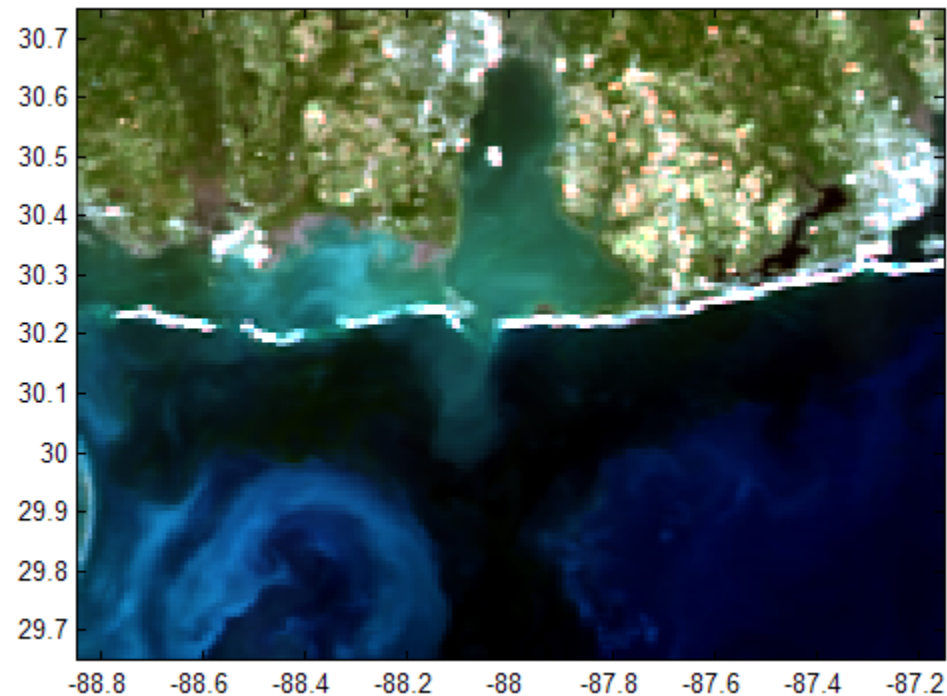
Mobile Bay

Changes in 1974 Forest as of 2007



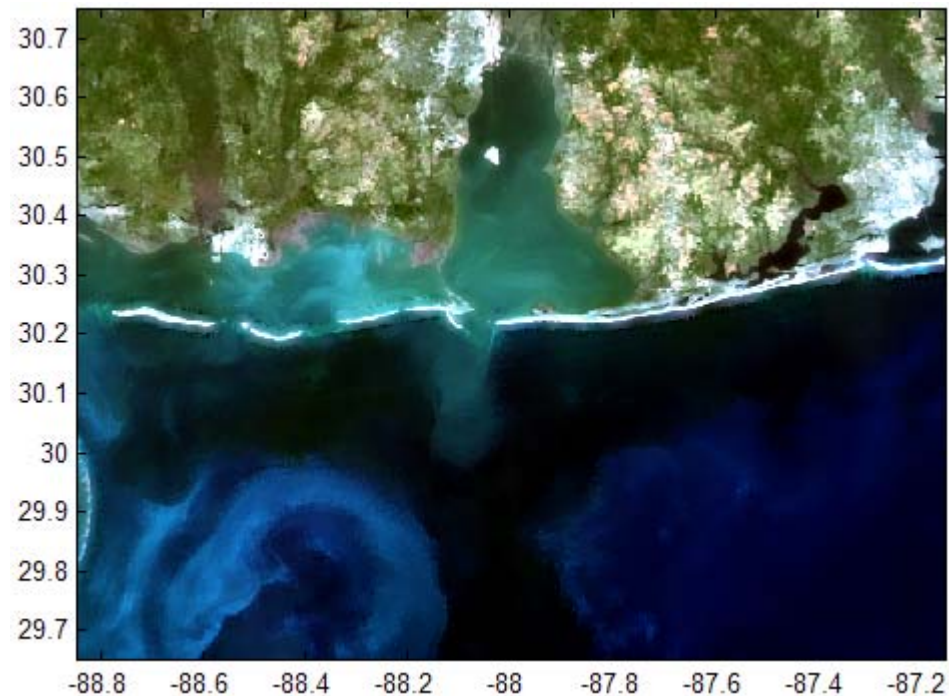
Detecting Suspended Sediments with MODIS

MODIS 1000m



MODIS-Aqua, 9 Nov 2007, RGB (Bands 10,12, 13lo)

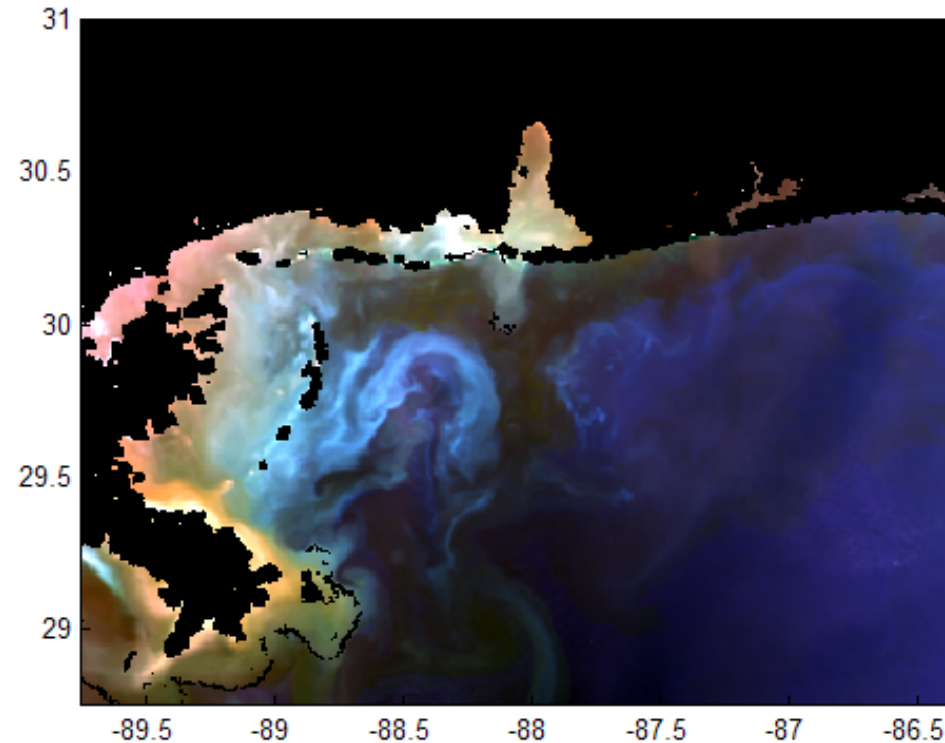
Pan Sharpened MODIS 250m



MODIS-Aqua, 9 Nov 2007, MODIS Ocean Color bands (1000m) fused with the mean of the Red and NIR bands (250m) using local mean and variance matching filtering techniques. Pan sharpened MODIS data products were used for VIIRS simulations.

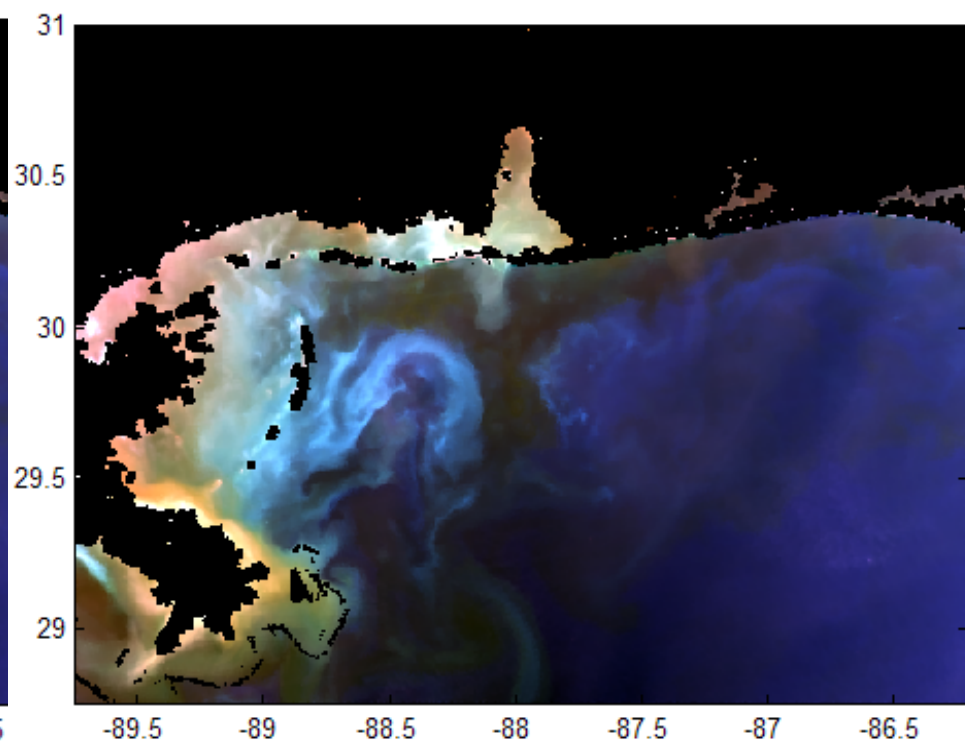
Detecting Suspended Sediments with MODIS and Simulated VIIRS

MODIS 1000m



MODIS-Aqua, 9 Nov 2007, 1000m (Bands 10, 12, 13lo), atmospheric corrected (dark pixel subtraction)

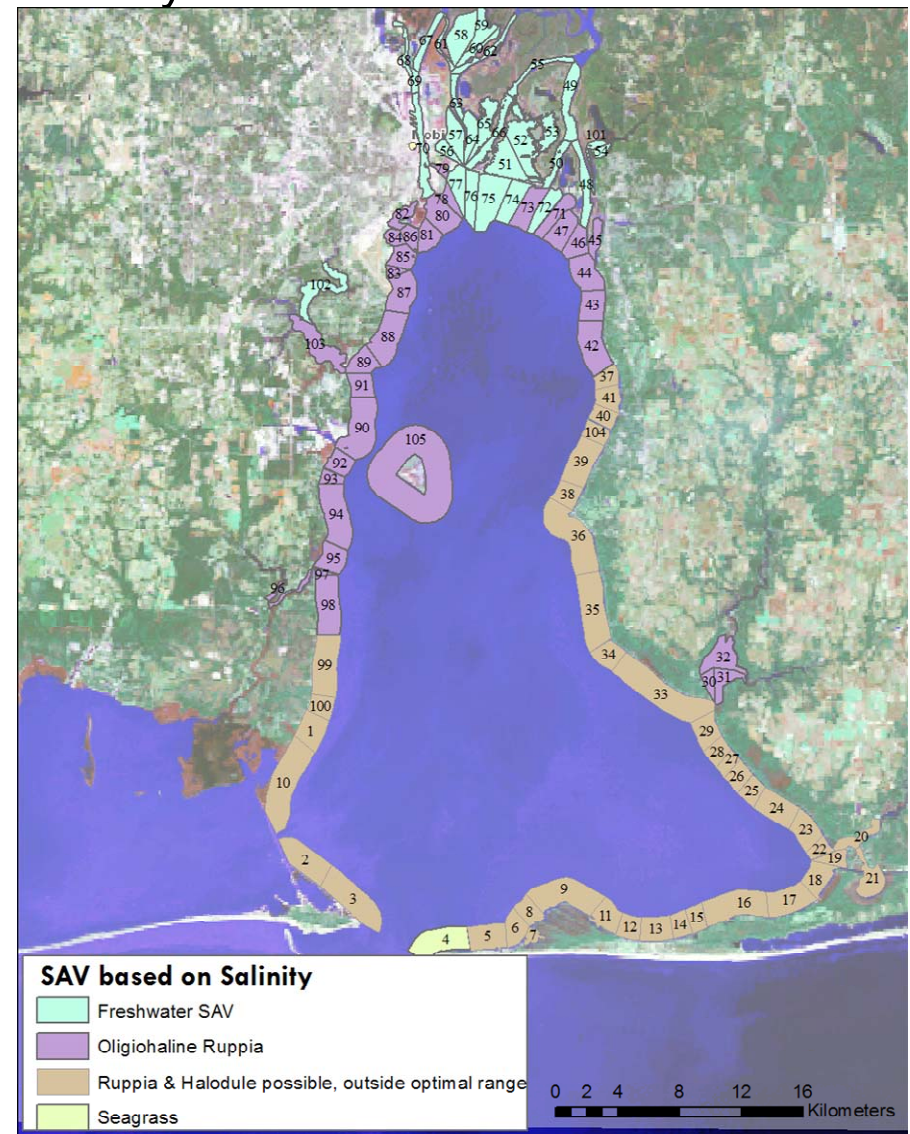
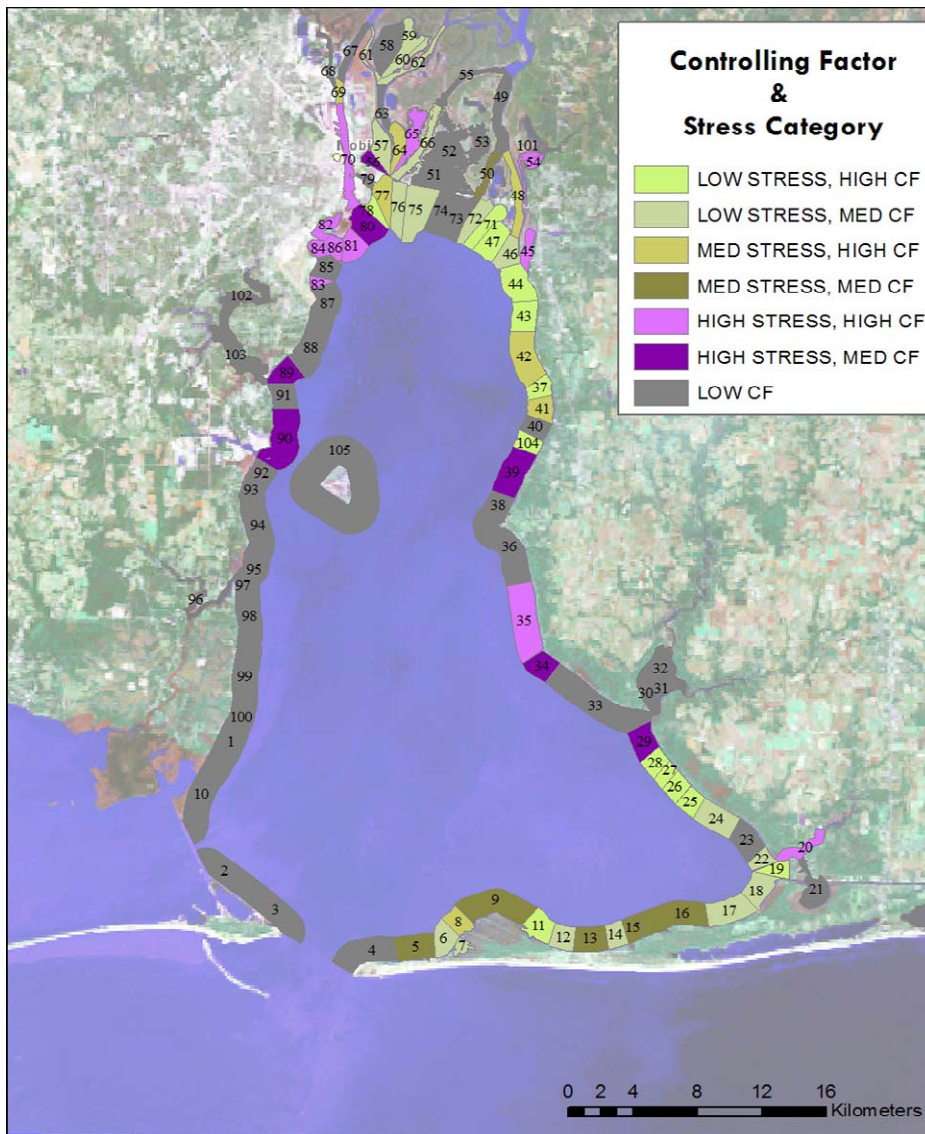
Simulated VIIRS 750m



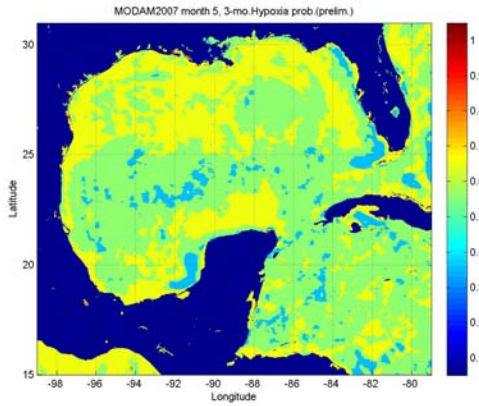
VIIRS1330 simulated, 9 Nov 2007

Gulf of Mexico Regional Collaborative (GOMRC)

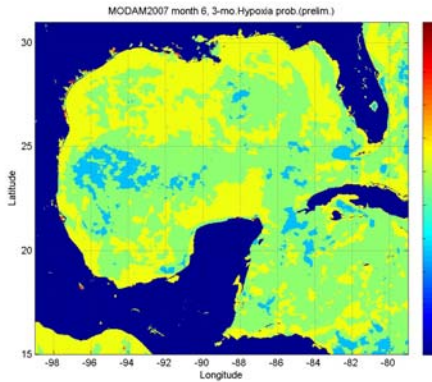
Restoration Prioritization Toolset Demo: SAV Prioritization and Salinity Classification



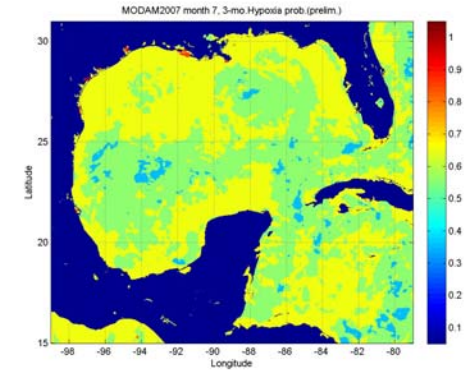
Preliminary Hypoxia Probabilities



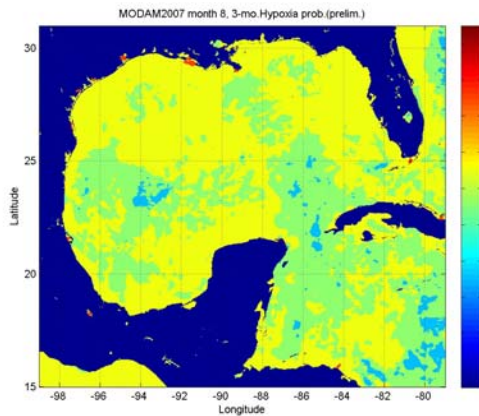
May 2007



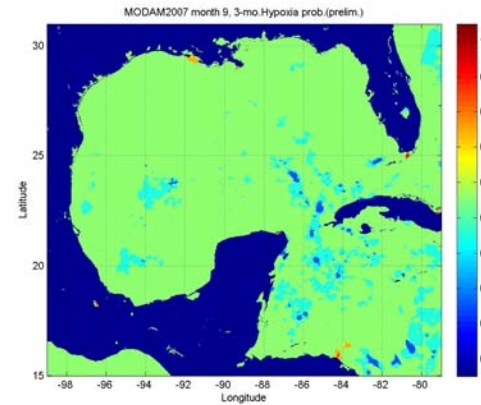
June 2007



July 2007



August 2007



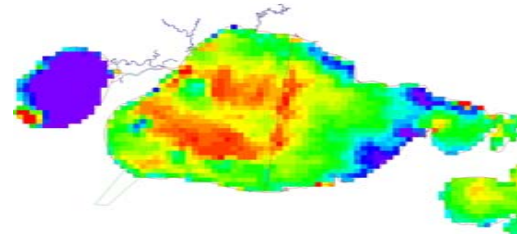
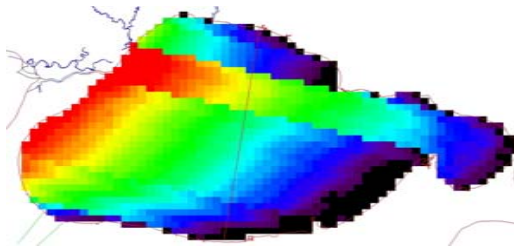
September 2007



Coastal Water Quality

Resuspension and Particle Transport

Application of remote sensing and a shallow-water wave model to identify bottom sediment resuspension so that the mobilization and transport of particles and particle-coupled pollutants can be routinely monitored



COAST:

Coastal Online Assessment and Synthesis Tool

COAST

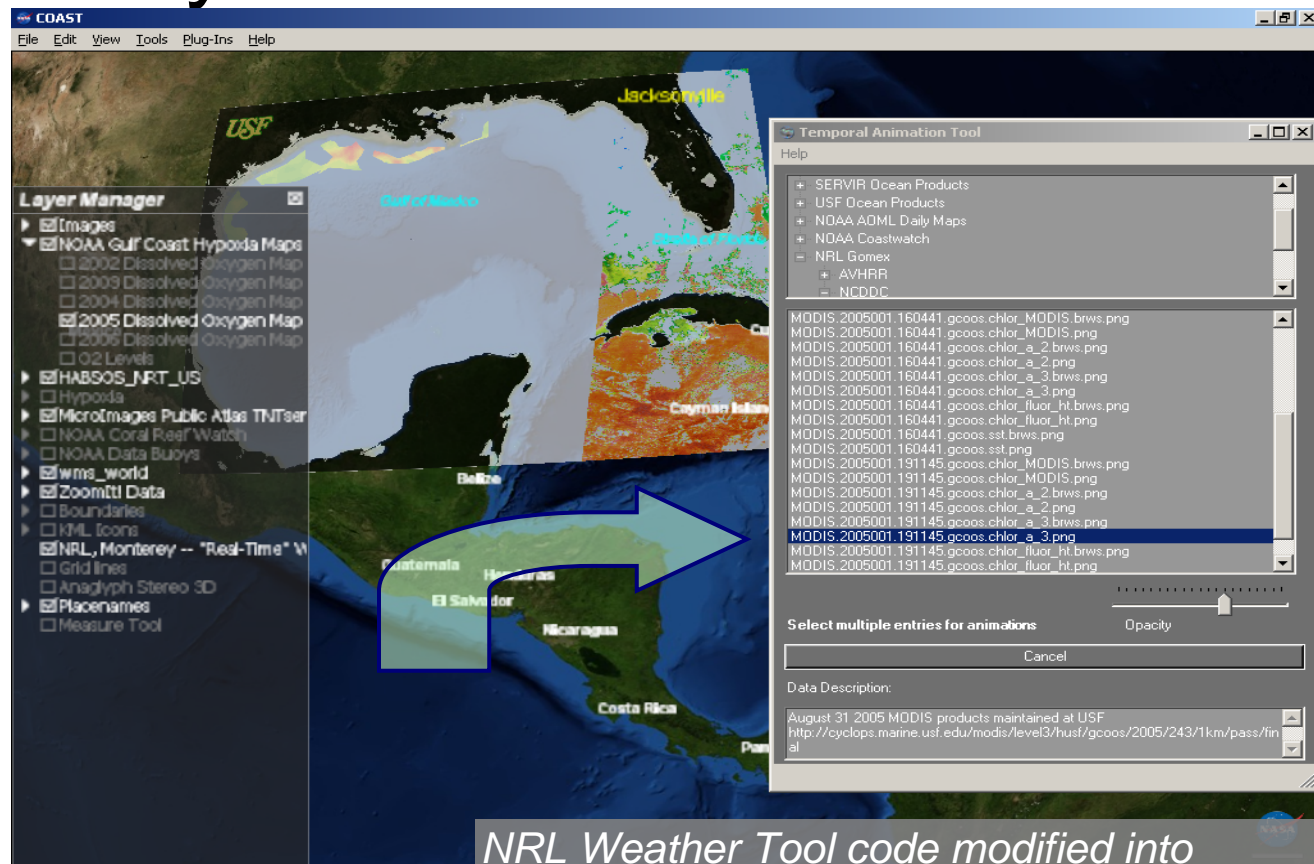
*Integrating the most appropriate and useful tools from other **World Wind** derivatives and sources into a new code compilation that maps datasets pertinent to coastal research purposes*

In other words...

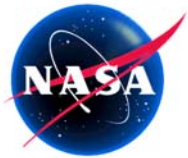
If good extensible tools are already made and are open source...

Collaborate, borrow, modify, and recompile.

And save man-hours.



NRL Weather Tool code modified into Temporal Animation Tool with links into Hypoxia related online data directories from: SERVIR, USF, NOAA AOML, NOAA Coastwatch, NRL Stennis, and local data



NASA ROSES Solicitation



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**A.28 EARTH SCIENCE FOR DECISION MAKING: GULF OF MEXICO REGION
Amended on June 26, 2008. This amendment introduces a new ROSES-2008 program element. Proposals are due September 30, 2008.**

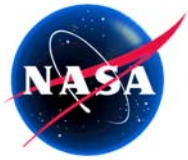
Overview

NASA solicits proposals that develop and demonstrate innovative and practicable applications of NASA Earth science observations, models, and research to support resource management, planning, and decision making activities in the Gulf of Mexico Region.

Programmatic Information

Total Amount of Funding	\$4M total
Anticipated Number of Awards	10 – 25 projects
Expected Range of Award per project	\$150K - \$400K total
Period of Performance	up to 24 months
Expected Project Start Date	circa January 1, 2009

Partner in-kind contributions strongly encouraged. However, partner funding does not count toward funding level guidelines.

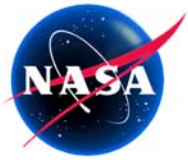


The Road Ahead



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- FY08 focused on building partnerships
- Complete FY08 project plan on schedule and cost
- FY09 Project Plan will factor in Lessons Learned
- Drafting a 3 – 5 year Strategic Plan
- How to utilize University Affiliated Research Center



Attract a Competitive Workforce



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➤ **Strategic Alignment**

Align human capital management strategies with Applied Sciences Coastal Initiative's goals, and objectives

➤ **Talent Management**

Address competency gaps, and then implement programs to attract, develop, and retain quality talent. FIND THE RIGHT PEOPLE.

➤ **Results-Oriented Performance Culture**

Promote high-performing workforce by implementing and maintaining effective performance reviews.

A satellite image of a coastal region. On the left, a large body of water (likely a bay or estuary) is visible, with a river flowing into it from the top. The land is covered in green vegetation and white patches, possibly snow or urban areas. The right side of the image shows a dark blue ocean. The word "Questions?" is overlaid in white text on the right side.

Questions?